Petroleum Economy of MTS'S and State Farms

by

N. N. Speransov

Neftekhozyaystvo MTS i Sovkhozov, pp 33, 34;
210-246, Russian, bk, 1950

INSTALLING AND PLANNING PETROLEUM BASES

In the initial phase of installing or planning a new petroleum base or modernizing an existing one, it is necessary first of all to establish the following initial indexes: (1) petroleum-base capacity, depending on the quantity of different kinds of petroleum products which must be kept at the given petroleum base; (2) list of buildings and other structures which the petroleum base must have; (3) fire-prevention breaks, that is, the necessary distances between the limits of the petroleum base and neighboring objects (homes, production buildings, etc), and also between different buildings and structures of the petroleum base itself.

The petroleum-base capacity for different MTS and sovkhozes can vary within fairly considerable limits.

To accordance with typical MTS petroleum-base projects, approved by the Ministry of Agriculture USSR 8 April 1948, their capacities are determined as follows (see Table 1).

In addition, diesel fuel, tractor nigrol and solidol, and also small quantities of machine oil and motor oil must be kept at the indicated petroleum bases (in percentage to the stock of corresponding kinds of fuel).

The above-indicated capacities must be viewed as average for corresponding managements. When planning each specific petroleum base, they must be made more exact to conform to local conditions. Capacity needs can be made more exact by proceeding from the following calculations.

The necessary capacity for tractor fuel is determined by the maximum expenditure of the tractor pool for the spring sowing operations and 50 percent of fallow plowing operations, plus a normative fuel reserve (that is, a reserve for 3 to 5 days of tractor operations).

Capacity for gasoline storage is computed as the sum of the following components: (1) gasoline expenditure by combines for the entire area of combine harvest; (2) starting gasoline expenditure for tractor operations, the expenditure to be determined by percent norms to the maximal tractor fuel reserve, and (3) gasoline expenditure by trucks for the entire period of gathering in the harvest.

It is standard practice to define the gasoline expenditure in sovkhozes for trucks during the entire period of gathering in the harvest, as the fuel expenditure for the entire grain shipment. In MTS it is determined by the maximal mileage of all own trucks during one month's operations.

The necessary capacities for storing avtol, diesel oil, tractor nigrol, and solidol are determined by percent norms to the reserve of corresponding types of fuel.

The necessary capacity of MTS and sovkhoz petroleum bases for storing other petroleum products is taken as the expenditure of these petroleum products during one month's operations of corresponding machines and mechanisms.

TABLE 1

AVERAGE CAPACITIES FOR TYPICAL MTS PETROLEUM BASES

| Name of Petroleum Product | Types of MTS: 50 Tractors | 75 Tractors | 100 Tractors |
|---|---|---|---|
| | Capacity (in tons) | | |
| Kerosene | 140 | 180 | 245 |
| Diesel fuel | 13 | 34 | 40 |
| Gasoline | 25 | 36 | 50 |
| Avtol | 13 | 18 | 25 |

## CHAPTER X

## COMBATING LOSSES OF PETROLEUM PRODUCTS

In organizing and operating MTS and sovkhoz petroleum managements, the taking of special steps to prevent quantitative and qualitative losses of fuels and lubricating materials is of especial importance.

Due to the peculiarities of physical and chemical properties of petroleum products, they are very susceptible to all kinds of losses and spoilage.

The chief types of quantitative losses of petroleum products are: (1) evaporation; (2) leakages; (3) spillages; and (4) losses from incomplete emptying of petroleum containers.

To qualitative losses or spoilage of petroleum products pertain: (1) changes in fractional composition of a fuel due to evaporation; (2) contamination of petroleum products by various extraneous admixtures; (3) watering; and (4) internal changes in the quality of petroleum products under the influence of oxidation, tar formation, etc.

When petroleum products are handled unskillfully or incorrectly, their losses or spoilage can reach very great proportions and can cause considerable harm to the economy.

### 1. COMBATING LOSSES FROM EVAPORATION

The formation of vapors of a liquid over its surface is called evaporation or volatility. If these vapors mix with the air and leave



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into the atmosphere, the loss of a portion of the liquid takes place. But if, under the influence of cooling or other causes, these vapors are condensed and returned to the liquid from which they had previously evaporated, there will be no losses in the liquid.

The speed of evaporation and the amount of losses which result from it depend upon the type of liquid subjected to evaporation, and upon the conditions in which the liquid is found.

Light types of petroleum products, especially gasoline and ligroin, and then kerosene, are distinguished by their increased capacity for evaporation. Numerous cases are known when evaporation has caused very great losses, which reached 10-15 percent or more of the quantity of fuel being stored.

In order to prevent the indicated losses, it is very important to know what causes an increase in evaporation and what measures one must take to combat these losses.

The chief causes influencing an increase in evaporation are:

1. Temperature. The higher the temperature of the outside surroundings, and the more strongly the petroleum product is heated, the stronger its evaporation will be.

2. Area of evaporation surface. With an increase of this area, the evaporation of the petroleum product is intensified.

3. Saturation of the air space over a petroleum product with its vapors. When, in the air space located over the surface of a petroleum product, the content of vapors of the petroleum product is insignificant, the evaporation of the product takes place very

intensively; but evaporation is impossible in a gas space which is saturated with the vapors of a petroleum product.

4. Volume of gas space. With an increase of volume of the gas space in which evaporation is taking place, the degree of evaporation of petroleum products increases sharply.

5. Intensiveness of air exchange over the evaporation surface of the petroleum product. The more rapidly air exchange takes place over the evaporation face, the higher the losses will be.

In order to prevent losses of petroleum products, one must strive to lessen or eliminate the influence of individual factors contributing to evaporation.

For example, in order to shield petroleum products from heating, which is especially necessary during the summer, it is recommended that the following steps be taken in agriculture.

When the management has underground tanks or tanks sunk into the ground, they should be used to store petroleum products which are most subject to evaporation, that is, gasoline and ligroin, first of all. When the same petroleum products are stored in barrels, one should use for the most part storage depositories which are sunk into the earth: basements, cellars and dugouts.

When extremely volatile fuels are kept in tanks above ground, the tanks should be guarded as much as possible from the heat of the sun's rays. Very simple and effective measures of such protection are: the planting of quick-growing leaf trees around petroleum base tanks to shade them, and also painting the tanks with lighter colors -- white, or even better, silver or aluminum. A light color reflects the sun's rays better and for that reason reduces heating of tanks (Tables 9 and 10).

TABLE 9

THE INFLUENCE OF COLOR OF PAINT OF TANKS UPON THE TEMPERATURE OF A PETROLEUM PRODUCT HEATED BY THE SUN'S RAYS

| Color of paint | Temperature of gasoline (in degrees) | Color of paint | Temperature of gasoline (in degrees) |
|---|---|---|---|
| Aluminum | 11.5 | Red lead | 16.6 |
| White | 12.5 | Dark blue | 20.3 |
| Light cream | 13.0 | Chrome (green) | 22.0 |
| Pink | 13.3 | Black | 30.0 |
| Gray | 14.6 | | |
| Light blue | 13.6 | | |
| Green | 14.7 | | |

TABLE 10

THE INFLUENCE OF COLOR OF PAINT UPON THE EVAPORATION OF A PETROLEUM PRODUCT HEATED BY THE SUN'S RAYS

| The color of paint of a vessel having a capacity of 10 litres, with a 1 millimeter opening in the roof | Gasoline Losses (in litres) | |
|---|---|---|
| | After 24 hours | After 72 hours |
| White | 0.9 | 2.0 |
| Gray | 1.5 | 2.7 |
| Red | 1.6 | 2.8 |
| Black | 1.9 | 3.5 |

Moreover, whenever possible, it is very useful on hot days to cool the tanks with water. For this purpose, a water supply line is carried to the center of the surface of the tank roof; at the end of the line there is a special device -- a sprinkler (see Figure 38) for spraying water continuously over the tank. The influence of sprinkling water over tanks upon decreasing losses from evaporation is shown in Table 11.

TABLE 11

THE INFLUENCE OF COOLING TANKS BY SPRINKLING THEM WITH WATER UPON THE TEMPERATURE OF PETROLEUM PRODUCTS AND LOSSES OF THEM FROM EVAPORATION WHEN THEY ARE HEATED BY THE SUN'S RAYS

| Tank characteristics | Average temperature of the surface of gasoline | Losses from evaporation in percentages after 85 days |
|---|---|---|
| Hermetic tank with breathing valve regulated for a pressure of 35 millimeters of water column | 34.4° | 1.54 |
| The same tank, but cooled by water | 26.6° | 0.65 |

Fuel located in movable storage facilities under the open sky must also be protected from the sun by painting the containers in light colors; by covering the barrels with fuel tarpaulins and soaking the latter with water, if possible; by setting up truck tanks and service carts in the shade of trees; etc.

In order to decrease the area of evaporation surface of petroleum products, it is suggested that tanks having the smallest inside diameters be used in the summer time to store highly volatile types of fuel.

In order to reduce volume of gas space in which evaporation of petroleum products can take place, fuel should be kept, insofar as possible, in full tanks. It is forbidden to store one type of fuel in several partly-filled tanks.

The influence of degree of saturation of air gas space over the surface of a petroleum product upon its vapor formation is closely bound up with the speed of air exchange over this surface. The slower air exchange takes place over the surface of a petroleum product, the more the gas surface will be saturated with vapors of petroleum product, and consequently, the greater the evaporation will be. Therefore, to reduce losses of petroleum products from evaporation, it is necessary to curtail, as much as possible, air exchange within the tank and the resulting blowing off of petroleum product vapors over its surface.

When a petroleum product is kept in a covered vessel, for example a tank, which has a cover, the departure of vapors of the petroleum product and their replacement by fresh air takes place under the influence of the following causes.

When a tank is filled, the liquid forces out the mixture of petroleum vapors and air which is located in it. The vapors leave the gas space of the tank into the atmosphere. The vapors which have left the container are, under ordinary conditions, an inevitable loss. When a container is emptied, fresh air enters and this also is saturated with petroleum vapors.

Under the influence of constant variations in temperature of atmospheric air, the petroleum product located inside the tank is heated or cooled. When it is heated, intense evaporation takes place, as does heat expansion of the liquid and petroleum vapors. As a result, the vapors leave the tank. During this process, the more intensively the heating of the liquid proceeds and the greater the volume of gas space in the container, the more vapors of the petroleum product will leave into the atmosphere outside. When the tank is cooled, the opposite phenomenon has been observed: the air outside enters the tank.

In order to reduce losses of petroleum vapors from the tank, it is necessary to cut down as much as possible the volume of gas space in the tank and, insofar as possible, to prevent petroleum vapors from escaping to the outside.

The basic way of preventing petroleum vapors from escaping from the tank into the atmosphere is to make the roof of the container hermetically sealed and to provide the container with special breathing valves. Moreover, protecting a tank from heating, in its turn, aids to reduce its "respirations", and the resulting losses of the petroleum product from evaporation.

Together with the breathing processes of tanks, which take place when the tanks are filled or emptied (large respirations), a cause of air exchange within tanks and escape of petroleum vapors from the container as a result of this, is the blowing off of vapors of the petroleum product from the inner space of the tank through various openings in the roof of the container, under the influence of the wind, etc.

These accidental openings, like hatch covers that have not been closed tightly, chinks in the roof from unsealed openings for floating fuel level indicators, etc., are extremely dangerous. Inside the gas space of the tank, under the influence of these openings, drafts are created which almost uninterruptedly expel petroleum vapors from the container, and this greatly increases the evaporation of the petroleum product.

Therefore, full hermetic sealing of covers for all tanks in which gasoline, ligroin, and kerosene are stored, is an indispensable condition for combating losses of them from evaporation. When containers do not have breathing valves, curved breathing tubes made out of lengths of gas pipe should be used instead of them.

Although a breathing tube permits free contact between the inner gas space of the tank and the atmosphere outside, it precludes the possibility of the formation of drafts.

In order to seal tanks hermetically, it is necessary that the roofs fit completely tight, that all their upper hatches be sealed with washers, and that all upper opening (for controlling gate valves, floats, etc) be sealed by special stuffing boxes.

## 2. COMBATING LEAKAGES

Leakages, or the escape of a liquid, is its more or less constant flowing or soaking through various openings or loose places.

Leakages of petroleum products take place for the most part as a result of one of the following causes: (1) disrepair of tanks or other types of petroleum containers, and also of petroleum equipment (pumps, pipe-lines, various shut-off installations, joints, etc); (2) unsatisfactory sealing of small containers -- barrels and cans; (3) incorrect assembly and installation of lines for pumping liquid petroleum products or incorrect joining of different types of equipment and fittings; (4) using, for petroleum equipment, gaskets or stuffing box packing made of unsuitable materials; (5) filling tanks or moveable containers too full with petroleum products, as a result of which, when the volume of the liquid increases under the effects of heating (usually in hot weather during the summer), the excess petroleum product flows out of the tank.

Petroleum product leakages can be visible or invisible. The latter type of leakages is especially dangerous, because frequently no attention is given to "invisible" losses since no one knows of their existence. The follwoing can be cited as examples of "invisible losses.

1. Disrepair of the bottom of a vertical tank set on a sand foundation allows the petroleum product to flow out into the earth. In the majority of instances this remains unnoticeable from external observation.

2. Sometimes something like "oily" patches appear on tanks containing petroleum products, most frequently those containing kerosene. Frequently these spots are explained as sweating of these products and no attention is paid to them. However, each such patch shows that there is a leak beside it, through the wall of the tank.



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The appearance of "oily" patches is explained by the fact that a slowly leaking petroleum product is moistening the surface of the tank, darkening it slightly at this spot; this is especially visible when the tank is covered with dust. Due to the comparatively slow leakage of the product, no direct leak is noticeable, since the liquid has time to evaporate. If kerosene is leaking and the tank is painted a light color, these "oily" patches are always easily noticeable. It is much more difficult to notice such leakage of gasoline, because evaporation of gasoline takes place considerably more rapidly.

3. Invisible leakages frequently take place through plugs and stoppers that seal barrels of petroleum products. Dampness of plugs is often considered the result of the sealing's becoming wet, and therefore no attention is paid to it. Actually, however, this is the result of fuel leaking out of the barrel, the sealing in some instances even serving as a sort of filter that draws the fuel through the plug opening. If a barrel is filled with a fuel, for example gasoline, which evaporates rapidly, these losses remain unnoticeable, even though they may be very considerable.

It is very difficult to express in figures the extent of losses of petroleum products due to various kinds of leakage. However one must keep in mind that even the most insignificant leakage in the form of individual drops, in view of the fact that leakage is continuous, can grow to a very large loss of petroleum products.

According to observations of the State Scientific-Research Petroleum Institute, observations made over three kerosene tanks at the Odessa petroleum base, losses from leakage in the form of drops falling out of tank fastenings, manholes, and cocks comprised from 2 to 4.3 kilograms a day for each container; this represents 730 to 1,570 kilograms a year for each tank.

The basic condition for a successful struggle against losses of petroleum products due to different types of leakages is the prevention of the very possibility of their ever occuring.

Although all containers are built with an observation of the rules established for this, nonetheless each tank must be carefully checked to see that it is hermetically sealed before any petroleum products are loaded into it. Tests of the hermetic seal of petroleum containers under MTS and sovkhoz conditions are carried out both when they are installed at petroleum depots and after each one of them is repaired.

After a careful external examination of the container, the hermetic seal of its joints is tested. The tightness of joints is checked 2 or 3 times (at an interval of 3-5 hours) by moistening the inner surface of the tank freely with kerosene and whitening the outside surface with chalk. Looseness is discovered when "oily" (kerosene) patches appear on the outer surface of the tank.

When the checking of joints is completed and all discovered defects have been corrected (with a necessary secondary check of the places where repairs were made), the entire tank undergoes testing. This test is carried out by filling the tank with water or a mixture of water and kerosene. In the latter instance, a comparatively thin layer of kerosene is poured in, which thus tests the lower part of the tank. Then water is gradually added, and since the kerosene is lighter than water, it floats to the top. Thus, all the time that water is being poured in, the tank is being tested by kerosene. Testing tanks by pouring in water mixed with kerosene is recommended for the reason that, with the aid of water, a heavier liquid, the stability of the container can be checked better, while the upper layer of kerosene makes it possible to check the hermetic seal of the tank well.

Testing the hermetic seal of the roofs of vertical tanks is carried out by heating the air in the space between the upper level of the liquid poured into the tank and the floor of the roof. Excess pressure must be kept at no less than 12 millimeters of mercury column. The roof joints are smeared from the outside with soapy water. Loose joints are discovered when soap bubbles appear in these places. When horizontal tanks are tested, the pressure of the liquid inside them can be created with the aid of a water pipe about 1 meter long, which is set up vertically over the upper opening of the tank when all other openings are sealed.

Water should not be used to test the hermetic seal of tanks during the winter, but only kerosene. (Footnote: after the completion of tests, this kerosene is allowed to settle, and then is used.) In an extreme case, check can be limited to moistening the inner surface of the tank profusely with kerosene 2 or 3 times.

After all tests are completed and the tanks are installed on their foundations, it is suggested that, before any petroleum products are loaded into them, the tanks be tested a second time by filling them with water and leaving it there for 2-3 days. When the tests yield positive results, the water is removed and the containers enter operations.

In order to prevent petroleum products from leaking out of tanks which are in operation, it is necessary constantly to see that they are in a good state of repair.

In order to prevent leakages through the bottom of vertical tanks which are set up on sandy bases, a thin layer of water is poured onto the bottom of the tank; the water, slowly leaking out through the smallest openings in the bottom (these openings can occur as a result of soil corrosion), prevents the petroleum product from leaking out. Cushion water can be poured into all tanks other than those filled with lubricating oils, since the latter are contaminated when mixed with water. Ordinarily, cushion water is taken out of the tanks before the arrival of frosts. However, if there isn't full confidence that the tank bottoms are intact, a thin layer of water 8-15 millimeters high is left; freezing, this layer forms a thin ice crust which prevents the petroleum product from leaking out.

Apart from observing that the tanks themselves are in good working condition, it is necessary to keep careful check of all shut-off installations (ventilators, stopcocks, gate valves, etc.), and also side manholes.

With regard to the latter, and also with regard to all flange joints (in pipe-lines, pumps, etc.), it is necessary to check the quality of washers which are placed under the openings of manholes and which are used to make the flanges tight. The use of leather, ordinary rubber, or other materials which can be eroded or decomposed by petroleum products, is completely inadmissible here.

In petroleum equipment, either washer materials made of fabric (for example, thiokol, etc.), or washers especially made out of rag cardboard about 3-4 millimeters thick are used. For this purpose, cardboard, after it is soaked in hot water, is boiled in varnish. As soon as it is well saturated with oil (varnish), it is put out to dry, and then it is moistened on both sides with a mixture of joiner's glue and white lead. Glue and white are taken in equal parts. Obviously, this washer can be used only until it loses elasticity.

For tanks which are to be used to store ligroin and gasoline, washers made of cardboard are boiled in a mixture of good joiner's glue and glycerine (in equal parts). After the cardboard is well saturated, it has to be soaked in a solution of chrome alum or formalin: this makes it waterproof. When the cardboard has dried out, it is rubbed on both sides with graphite.

In addition to the washer materials described, cardboard washers which have simply been moistened with glue yield good results for all petroleum products. These washers are made as follows. The necessary washer is made (cut out) of good cardboard. Then, before the washer is actually put in place, it is moistened on both sides (by means of submersion) with good glue (preferably fish glue). The moistened washer is immediately installed and held tight by bolts. In order to protect the washer from the rain, etc., the end faces of the flange are twice painted carefully on the outside with white lead or red lead which has been diluted with varnish. The reliability of this washer is explained by the fact that the cardboard used to make it fills up completely all the small irregularities in the working surfaces of the flanges when it is pressed between the flanges, due to the elasticity remaining in it (which elasticity is lacking in boiled cardboard). This type of washer, in view of its simplicity, is convenient to use, but these washers can be used only once.

In order to seal measuring hatches, it is recommended that washers made of factory-prepared washer materials be used; these washers stand up better under the constant opening and closing of the covers of these hatches. In particular, it is recommended that washers made of chlorovinyl be used for measuring hatches.

In those instances when petroleum equipment has stuffing boxes, it is recommended that a mixture of asbestos cord or asbestos flakes and fine silver graphite mixed with anhydrous glycerine be used for packing.

Packing is also made out of flax matting saturated with a compound of 60 parts good household soap, 37-38 parts vaseline, and 2-3 parts fine silver graphite. To make this compound, a vessel with a small amount of water is placed on a low fire, the soap is dropped in, and then the vaseline and graphite are added. When all this is well mixed, flax matting is immersed in the hot mixture; the matting should remain in the solution from 1 to 2 hours.

To prevent petroleum products from leaking out of barrels and cans, it is necessary to pay attention to the correct stopping of barrels and cans with special plugs having good washers, and it is necessary to prevent overfilling of petroleum containers when petroleum products are loaded into them. It is necessary to remember that with the approach of hot weather petroleum products located in tanks have lower temperatures than the air outside; therefore, when



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When petroleum products are carried in truck or other mobile tanks, it is necessary to check that the petroleum products do not splash out through the upper openings. To prevent this, it is necessary that tanks be filled without overflowing and that complete hermetic seal of the upper hatches be provided.

### 3. COMBATING SPILLAGES

Spillage of petroleum products during one or another operation is a sufficiently frequent phenomenon in many MTS and sovkhozes. The cause of this abnormal situation lies in the incorrect or unskilful fulfillment of operations in pouring fuel and lubricating oils.

The chief causes of spillage of liquid petroleum products are the following:

(1) loading by using various simplified means, for example, by means of rolling a barrel onto a bucket or by servicing tractors or other machines out of buckets or other vessels; (2) release of petroleum product through flanges that do not have distributing adapters for rapid shut-off of streams of liquid; (3) pouring the remains of fuel and other petroleum products out of flexible hoses after completion of pouring; (4) spraying and inflow of petroleum products due to incorrect use of hoses, pumps, and other equipment.

Considering the causes of spillage of fuel and oils, it is easy to draw up basic rules the fulfillment of which will prevent petroleum product losses.

First of all, it is necessary to load fuel and lubricating oils into petroleum storage facilities exclusively by pipe-lines, which should have hoses supplied with distributor adapters adjusted for rapid shut-off of streams of liquid.

Hoses with the same kind of adapters must be used to service tractor, truck, and other machine tanks. Machines must in no case be serviced by buckets, siphons, or similar vessels. Spare cans of fuel can be carried on trucks only for long trips; the trucks can be serviced out of the cans, but the cans must have pouring spouts to allow easy pouring.

Tractors and other machines should be serviced with liquid oil from oil cans with suitable spouts; the aid of funnels should not be resorted to.

To prevent the remainders of petroleum from pouring out of hoses after the completion of operations, these connections should be detached from the line only after they have been completely emptied.

To prevent petroleum products from splashing and overflowing when being loaded, suitable types of loading spouts must be used and they must be correctly lowered into the plug openings.

## 4. COMBATING OTHER TYPES OF QUANTITATIVE LOSSES OF PETROLEUM PRODUCTS

Among various losses of petroleum products, incomplete emptying of barrels and moveable tanks when fuel, or especially lubricating oils, are unloaded from them, is a sufficiently widespread practice in many managements.

Although unpoured remainders of petroleum products in barrels or tanks are not a physical waste, these reminders in the majority of instances represent direct loss to the given management. Incomplete unloading of petroleum tanks carried on trucks often comprises relatively large quantities. For example, incomplete unloading of a truck tank often amounts to 10 or more kilograms of fuel for each tank; incomplete emptying of railroad tank cars can reach even hundreds of kilograms of fuel.

Incomplete emptying of petroleum products from petroleum tanks carried on trucks is ordinarily the result of the following causes: (1) unsuitable form of container from which the fuel or oil is poured; (2) installing, in certain types of tanks, unloading devices somewhat higher than the possible lowest level of liquid in these tanks; (3) flushing out the inner surface of the petroleum container with a certain amount of the product to be poured. The last type of loss takes place most often when unloading viscous products -- lubricating oils, etc.

To provide for complete unloading of petroleum products from different types of petroleum containers, the following steps must be taken.

1. When emptying railroad tank cars of fuel through the top



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the remainder must be pumped out by a hand pump with the aid of a separate hose having a small intake pipe that can reach the greatest depth of the tank car.

2. In order to empty completely truck and other tanks the emptying devices of which have been installed on the bottom towards the rear, it is necessary that when these tanks are being unloaded the front wheels of the vehicle be driven onto an elevation, for example, small inclined platforms.

3. To empty a barrel completely, it should be tipped and shaken a little while in that position.

4. It is well known that the remainders of viscous petroleum products flow away from the walls of petroleum containers very slowly. Therefore complete unloading of oil and other similar products requires considerably more time than does unloading the remainders of fuel. In addition, when unloading frozen oils during cold weather, it is necessary to heat them.

The simplest way to heat barrels and cans containing oil is to place them in a warm spot.

In many managements, considerable losses of consistent lubricants (solidol, etc.) are observed. The quantitative waste of these products is for the most part the result of incomplete or incorrect emptying of the vessels in which the lubricants were stored, and large overexpenditure of lubricants when servicing machines with the aid of primitive methods such as small planks, trowels, etc.

Therefore the chief way to prevent losses of solidol and other lubricants (for example, axle grease) is to empty the petroleum container completely. During this process, the gradual intake of petroleum product from the barrels or boxes must be conducted from the entire surface, without forgetting to remove all the lubricant from the walls of the vessel. If this rule is not observed, remainders of lubricants adhering to the walls of vessels become thick and remain unused.

It is entirely necessary to service tractors and other machines with solidol by using syringes and solidol-injectors. Packing lubricants into Stauffer or other lubricators by using random pieces of sticks, planks, or iron results in an uneconomical expenditure of lubricants and poor lubricating of machine parts.

## 5. PREVENTION OF SPOILAGE AND LOWERING OF QUALITY OF PETROLEUM PRODUCTS

When petroleum products are handled incorrectly or unskillfully there inevitably takes place, in addition to quantitative losses, spoilage and lowering of their quality. Meanwhile, each lowering of the quality of fuels or lubricating materials has an extremely telling effect upon the operations of tractors, combines, trucks, and other machines.

For example, change in fractional composition of kerosene, ligroin, or gasoline due to evaporation makes the fuel heavier and also lowers its antiknock properties; this leads to an increased expenditure of this fuel per unit of motor operation, lowers the useful capacity of the machine, and increases its deterioration.

Contamination of diesel fuel with various mechanical admixtures can be the cause of spoiling fuel apparatus and can even cause accidents.

Contamination of lubricating materials with extraneous admixtures has a destructive effect upon the rubbing surfaces of machines, and in certain instances can lead to breakdowns in feeding oil to friction points and can lead to very serious accidents.

Therefore the preservation of the high quality of all petroleum products is a very important task and the obligation of every MTS and sovkhoz.

Protecting light types of fuel from changes in their fractional composition is achieved by the same measures that were described above with regard to combating losses of petroleum products due to evaporation.

Protection of petroleum products from contamination by extreneous admixtures (sand, dust, rust, dirt, etc.) is provided by carrying out the following elementary rules for handling petroleum products.

1. A petroleum product must be loaded only into a clean petroleum container. If it is necessary to pour it into a petroleum container that formerly contained another petroleum product that must not be mixed with the first (for example, to pour fuel into a container that had contained lubricating oil, or vice versa), the petroleum container must first be carefully cleaned (Footnote: The rules for cleaning petroleum containers are described below, in Chapter XIII.) and washed.

The rule concerning cleanliness of petroleum containers is completely applicable to all petroleum equipment (pipe-lines, pumps, hoses, etc.).

2. When wooden barrels are used for petroleum products, their inner coating of glue must be kept entire, since loosened pieces of glue spoil the petroleum product, especially lubricating oil. Also, water should never be allowed to fall into wooden barrels, because the glue coating is dissolved by it, pieces of the glue mix with the petroleum product, and spoil it.

3. In order to protect petroleum products from contamination by sand or dust, it is necessary that all tanks always be kept tightly closed and that they do not have any contact with the outside atmosphere, except the contact through breathing installations (breathing valves and pipes, and also ventilator flues). Barrels and other small vessels must be well corked.

4. Intake (sucking) pipes and other installations which are dropped into tanks that are to be unloaded must be carefully wiped before use. When not in use, pipes and other appurtenances must be put away in special boxes. This rule is also completely applicable to servicing equipment -- distributing adapters, lubricating cans, etc.

5. Dirt and dust must be wiped from petroleum equipment and appurtenances only by material that does not leave lint, threads, etc.

Apart from applying the measures enumerated above for protecting petroleum products from all types of contamination, good organization of filtration and settling has a great effect upon guaranteeing cleanliness of petroleum products.

Filtration of petroleum products is of two types: (1) preventive, and (2) special, for cleaning petroleum products known to be



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contaminated.

Preventive filtration of petroleum products is used as they are pumped in or out, by installing appropriate filters (see Chapter V, Section 6) in pipe-lines or other feed lines. This filtration aids in raising the purity of petroleum products and therefore it should be considered obligatory for all operations connected with pumping fuel or liquid oils.

Ordinary filtration is insufficient for petroleum products known to be contaminated, since the finest mechanical admixtures pass through even frequent filter screens and other similar filtering elements. Therefore it is necessary in these instances to use special filters, which are capable of holding back fine admixtures, and also of making analyses of the petroleum products that have been filtered.

Unfortunately, special filters, owing to their small degree of porosity or considerable thickness of the layer of filtering material, are distinguished by their poor capacity to allow liquids to pass through them (a liquid moves slowly). Therefore considerable time is needed to filter petroleum products through them, and moreover, even with slow filtration, these filters have to be fed the liquid under pressure.

For these reasons, filters which are capable of purifying petroleum products of even fine impurities, are used in MTS and sovkhoz petroleum managements only in individual instances and for special purposes: for example, to purify lubricating oils known to be contaminated, and also to remove fine mechanical admixtures from diesel fuel, etc. Moreover, in the majority of instances the indicated filters are used only as independent filter installations.

Of the various special filters, the best-known and the most perfect are the so-called filter presses. A layout drawing of a small filter press is shown in Figure 123. This filter press consists of a framework inside which are located vertically-placed frames and plates, and one drip pan under them. On the outside the filter press is ordinarily covered with a metal housing having a cover (the housing is not indicated in the drawing).

The framework of the filter press is a rigid frame having a back plate 1 and a front bracket 2, joined by the cross bars 3. The bracket has a traverse beam on which is fastened an adjusting screw with a handwheel 4. This screw is fixed in the front bracket 5, which is able to move freely back and forth along the cross bars of the framework. In the free area between the back bed plate and the front pressing plate are placed alternately wooden or cast iron frames 6 and plates 7. These plates and frames have side projections by which they rest upon the cross bars of the framework. The number of frames and plates must conform to the free area that they must fill between the back bed plate and the front pressing plate when the latter is moved out to its furthest position with the adjusting screw turned out as far as possible.

Each plate is covered with filtering cloth (belting is ordinarily used for this purpose) in which a cut is made to correspond to the upper opening located in the plate. Between the last frame and the one next to it is placed a piece of filter paper in which is also made a cut opposite the openings in the plate and the frame. After all plates and frames are placed in the framework, they are



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pressed closely together by means of the adjusting screw which is turned by the handwheel.

FIGURE 123

Layout drawing of a filter press: 1 - back plate of the frame; 2 - front bracket; 3 - connecting cross bars; 4 - handwheel for the adjusting screw; 5 - front moveable plate; 6 - frames; 7 - plates; 8 - drain outlets; 9 - intake connecting pipe.

When setting up a filter press, it is necessary to make sure that:

(1) all frames and plates are correctly inserted alternately; (2) the paper laid between them is not torn and that it covers the entire side surface of the plate adjacent to the corresponding frame; (3) the through openings in the plates and frames do not coincide when installed, thus forming one continuous channel through all plates and frames (the existence of such an open channel is checked each time the press is assembled by forcing a thick wire through it); (4) the beginning of the channel indicated above coincides with the opening in the back bed plate to which is connected the intake connecting pipe 9 of the filter press. After the filter press is set up, the drain outlets 8 in all its frames must be opened.

FIGURE 124

Working drawing of a filter press: 1 - general channel; 2 - cuts in the frames; 3 - slots in the plates; 4 - lower openings; 5 - trough.

The operations of a filter press are shown diagramatically in Figure 124. The petroleum product to be filtered is fed by means of a pump into the installation through the channel 1 and, passing through the holes 2 in the frames, fills the area between the walls of the frames and the neighboring side surfaces of the plates. After all sections of the installation are filled with the liquid, pressure begins to build up in the filter press, because the pump continues to feed the remaining portions of the petroleum product into the installation. The petroleum product, lacking an exit, presses on all sides and begins, within the frames, to filter through the filter paper and cloth. The petroleum product which has filtered through them and which has thus been purified of admixtures falls into the slots 3 of the plates, and, flowing downwards, leaves through the openings 4 into the groove from which it flows into the trough 5, then leaving the filter press to enter the intake container.

As is obvious from what has been explained, the more plates and frames there are in a filter press and the larger they are in dimensions, the greater the overall filtering surface of the installation will be, and consequently, the higher its productivity.

The mechanical admixtures located in the petroleum product being filtered collect on the filter paper and form on its sheets layers of so-called filter press cakes, which also begin to act as filtering material. Therefore, the quality of filtration of the petroleum products increases as the indicated press cakes are formed.

When the installation is first put in use, it is recommended that the first portions of the filtered petroleum product be subjected to secondary filtration, since they may be insufficiently clean due to dirt that has got into them; this dirt may have got inside the installation when it was being set up. In order to provide for the possibility of filtering viscous petroleum products, for example, avtol, it is necessary to heat them first to a temperature of about 40-50 degrees.

The assembled filter press can operate for a sufficiently long time and can purify one type of petroleum product until all the inner hollows of the frames are almost completely filled with filtered-out dirt. Only then, or if the pressure in the installation begins to rise more than 6 atmospheres, is it necessary to stop the operations of the filter press and have it cleaned. To do this, the drain cock must be closed and the adjusting screw must be turned to allow the residues of the petroleum product to flow into the drip pan. Then, holding the paper with the hand, the front pressing plate must be moved to its farthest position and the frame next to it must be removed; care must be taken that the paper does not become unstuck. The paper must first be pulled away a little at the bottom, to make sure that no residue of the petroleum product remains inside the frame. When the frame is removed, it is placed inside a drip pan box prepared for this purpose. Then the piece of paper is removed and the cake of dirt is cut away and removed with the aid of a dull knife. During this process all openings must be especially carefully cleaned of dirt. The cleaned frame is placed aside in a clean place, then the next plate is moved aside, the next frame is removed and cleaned, etc.

To use a filter press correctly, the pieces of paper placed in it must everywhere remain whole and untorn, and the cloth on the plates must not be covered with dirt. After the frames are cleaned of dirt, the filter press can be assembled for future operations, but if it is to be used to purify another type of petroleum product, it must be washed in pure kerosene, care being taken that the frames and plates are not injured. When a filter press is assembled, clean pieces of filter paper are placed in it, but the filtering cloth is not replaced. When disassembling and assembling a filter press, the order of placement of its individual frames and plates must be kept the same as before.

Under MTS and sovkhoz conditions, the use of filter presses is completely accessible, since they must be located at each regenerative installation. Therefore, in case of necessity a management can always clean contaminated petroleum products by using a filter press taken from a regenerative station.

In case a filter press or other special filter is lacking, low-viscous petroleum products can be cleaned by cloth filters similar to the NIMIS filter (Figure 125) which was constructed to filter diesel fuel. However the action of these filters is less reliable.

Apart from filtration, all petroleum products must be cleaned of mechanical admixtures by means of settling. Low-viscous petroleum products (kerosene, ligroin, and gasoline) are freed of mechanical admixtures sufficiently completely by means of settling. As the viscosity of petroleum products increases, their settling becomes more and more difficult. For example diesel fuel has to settle no less than 4 days for purification during the warm period of the year. Lubricating oils of the type of avtol, diesel oil, or nigrol, even after extended storage isolate only the heavier mechanical admixtures by means of settling.

However, despite the indicated limitations, special organization of settling processes for all petroleum products is extremely desirable, while for diesel fuel, due to the especially high demands on the part of diesel tractors for purity of fuel to be used for them, it is obligatory for all MTS and sovkhozes.

In addition to combating contamination of petroleum products, steps must be taken to prevent watering of them. Presence of water in petroleum products is inadmissible, since it causes corrosion (rust) in machines, and also causes other harmful effects.

FIGURE 125

Cloth filter of the MLIS system: 1 - body of the filter; 2 - intake connecting pipe; 3 - outlet connecting pipe; 4 - roof; 5 - drain plug; 6 - bag, serving as a filter; 7 - upper ring for the filter bag; 8 - wire spiral; 9 - binder twine.

Protection of petroleum products from watering is achieved chiefly by hermetically sealing all containers and by protecting fuels and lubricating materials against atmospheric precipitations (rain, snow, etc.) falling into them. In addition, extreme rise in the level of cushion water must not be permitted in tanks that fuel is stored in; lubricating oils must not be stored in damp basements; containers with chilled petroleum products must not be opened in a warmer room, because this causes condensation of water vapors from the air upon the surface of the cold petroleum products.

Water that has fallen into a petroleum product can be removed most easily by allowing the product to settle. However this method is completely effective only for low-viscous fuels. Even by heating lubricating oils, it is impossible to remove water from it completely merely by settling. Keeping in mind that special means of removing water from oils (special drying, etc.) are inapplicable in MTS and sovkhozes, it is impossible to preclude the possibility of watering of oils.

In order to protect petroleum products from spoilage as a result of mixing different petroleum productions, it is necessary that separate petroleum containers and other equipment (pumps, pipe-lines etc.) be used for each type of fuel and lubricating materials. If a petroleum product of a different type was formerly kept in a petroleum container, the container can be filled again only after it has first been cleaned.

To load an uncleaned container with one petroleum product after another or to use uncleaned equipment for different petroleum products is permitted only when loading the following petroleum products:

(1) ligroin after gasoline, or vice versa (excluding ethylated gasoline, an admixture of which, due to its toxicity, is not compatible with all petroleum products); (2) diesel fuel after light types of fuel; (3) kerosene after gasoline or ligroin, provided that the kerosene will not be used in kerosene lamps or kerosene stoves, in which there would be danger of explosion; (4) avtol after diesel oil; and (5) nigrol after all types of lubricants, other than solidol and axle grease.

## 6. NORMS FOR NATURAL DIMINUTION OF PETROLEUM PRODUCTS

When petroleum products are stored, shipped, received, released, or serviced, they are subject to a certain amount of diminution. This diminution of petroleum products is a result of various factors (evaporation and others) which we examined at the beginning of this chapter.

With correct organization and appropriate petroleum management equipment, losses of petroleum products can be kept to a minimum. However a certain amount of diminution of petroleum products is unavoidable under ordinary handling conditions. For example, when a tank is filled with fuel, the latter, entering the container, forces out of it the air in which vapors of the fuel are held. These vapors, leaving the tank and entering the atmosphere outside, represent pure loss.

Knowing the physical properties of petroleum products and the conditions for storing, shipping, and receiving-releasing it, it is possible, making appropriate observations, to establish so-called "natural" norms for losses. These norms are maximum and exceeding them is inadmissible. Each organization to which these norms for maximum losses apply is obliged to take all steps to keep actual losses below the established limit. This is completely possible by improving conditions for storing, pumping, accepting, and releasing petroleum products. Therefore the sometimes-used expressions "natural losses" or "normal losses", that is, losses which do not exceed the norms for established diminution, must be understood as arbitrary terms.

The norm for natural losses of petroleum products in MTS and sovkhozes was up to recent times established by a decree of the Economic Council of the SNK USSR, dated 4 January 1939, in the amount of 0.2 percent of fuel expenditure. At the present time, new norms for natural losses of petroleum products apply to MTS and sovkhozes. On 20 July 1949, Gossnab USSR, commissioned by the Council of Ministers USSR, confirmed these norms in the same amount for all ministries and departments.

MTS and sovkhozes (as well as all other organizations) have the right to apply norms for maximum losses of petroleum products only if they have a shortage of petroleum products. It is forbidden to write off petroleum products as expenditure in conformity with norms for maximum losses prior to the establishment of actual shortage.

Shortage of petroleum which is greater than the quantities envisaged by the norms for maximum losses ordinarily is evidence of certain lack of order in organizing or operating a petroleum management or evidence of its misuse. Therefore in the event that a shortage of fuel or oil is established in quantities surpassing the maximum permissible loss according to the norms, immediate investigation must be made of the causes of the "above-normal" shortage and those guilty must be made accountable in accordance with the law.

Every shortage in petroleum products which exceeds the norm for maximum diminution can be written off only in accordance with the decision of judicial organs or with the authorization of the Ministry of Agriculture USSR (Ministry of Sovkhozes USSR).

DESCRIPTION OF NORMS [illegible] MAXIMUM LOSSES OF PETROLEUM PRODUCTS

Since, under normal operating conditions, petroleum managements should not have leakages, dripping, or overflow of petroleum products, norms for maximum losses of petroleum products have been determined chiefly by taking into consideration the influence of evaporation and adhesion upon their diminution.

Keeping in mind that various types of fuel and lubricating materials are subjected to evaporation and adhesion in different degrees, new norms for maximum losses have been approved by types of petroleum products. In addition, the character of operations with petroleum products, and the influence of time of year and climatic zones upon extent of losses have been taken into consideration in the norms.

Therefore norms for maximum losses are differentiated according to a number of indices specified below.

According to character of operations, norms for maximum losses of petroleum products under conditions of MTS and sovkhoz petroleum management are divided into the following groups:

(1) storage of petroleum products in tanks; (2) storage of petroleum products in barrels; (3) acceptance (loading) of petroleum products into tanks; (4) releasing petroleum products to truck tanks, barrels, and other small capacities, and also servicing tractors and other machines; and (5) transporting of petroleum products along truck routes.

According to time of year, norms for maximum diminution of petroleum products are subdivided into autumn-winter and spring-summer. Autumn-winter norms are used during the half-year beginning



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1 October and ending 31 March, and spring-summer norms operate from 1 April through 30 September.

According to climatic zones, maximum norms for diminution are determined separately: for the southern zone, for the middle zone, and for the northern zone.

The division of the territory of the USSR into the three indicated zones, depending upon average temperatures, has been established as follows.

1. The southern zone includes: Union Republics -- Azerbaydzhan, Armenian, Georgian, Kirgiz, Tadzhik, Turkmen, Uzbek, and Kazakh (excluding the North Kazakhstan, Pavlodar, and Kokchetav Oblasts); Autonomous Republics -- Dagestan, Kabarda and North Ossetinian; Krays -- Krasnodar, Stavropol, and Primorskiy; Oblasts: in the RSFSR -- Astrakhan, Crimean, Groznyy, Rostov, and Stalingrad; in the Ukrainian SSR -- Odessa, Kherson, Izmail, Zaporozh'ye, Stalino, and Nikolaev.

2. The northern zone includes: the entire Asiatic part of the USSR, excluding the republics of Central Asia, the Primorskiy Kray, and the South Sakhalin Oblast; also, the Karelo-Finish SSR; Autonomous Republics -- Komi and Udmurt; Oblasts of the RSFSR -- Vologda, Yaroslavl', Kostroma, Sverdlovsk, Archangel, Kirov, and Molotov; National Okrugs -- Nenets and Komi-Permyak.

3. The middle climatic zone includes all the remaining territory of the USSR.

## NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS WHEN THEY ARE STORED IN TANKS

For storing petroleum products in tanks, norms for maximum



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losses are established in kilograms per month for one square meter of free surface of the petroleum product in tankage, or, in other words, for one square meter of evaporation face. These norms are given in Table 12. Consequently, the amount of losses maximally allowable for a particular petroleum product is determined by two conditions: (1) length of storage time, and (2) area of evaporation face of the liquid in the appropriate container.

In vertical cylindrical tanks, the area of evaporation face for each individual container represents one and the same, constant value. The latter is determined ordinarilly by means of a calibration (capacity) table for the appropriate tank, the table being drawn up for its lower circumference.

Mathematically, the area of evaporation face in a vertical cylinder is computed the same way the area of a circle is, that is, according to the formula:

$$F = \pi r^2$$

where F is the unknown area; pi is a constant value equal to 3.14, and r is the inner radius of the cylinder (tank).

In horizontal cylinder tanks, the area of evaporation face can be different depending upon the different levels that the container may be filled to. To determine the maximum norms for losses, it has been established that the areas of evaporation surfaces for all tanks of this type, regardless of the actual levels to which they are filled, are calculated by determining what area of evaporation surfaces the indicated containers can have if they are filled with petroleum products to a height of 0.75 of their diameters.

To facilitate calculations it is generally accepted that the indicated areas of evaporation face for each horizontal cylindrical tank can be determined in accordance with the formula:

$$F = 0.365\ dl,$$

where $F$ is the unknown area in square meters, $d$ is the inner diameter of the cylindrical body of the tank in meters, $l$ is the length of the body of the tank in meters, and 0.365 is the constant coefficient.

Evaporation face (surface) of each tank is determined one time, as a value which does not change for the given container.

Determination of evaporation face of all tanks, in order to make possible the application of maximum norms for losses, must be conducted in MTS and sovkhozes by specially appointed commissions composed of a chief engineer (senior mechanic) or a chief agronomist (chairman of the commission), chief bookkeeper, and the petroleum management director.

The values of evaporation face which the commission establishes for each tank must be fixed by appropriate documents. These documents, with the calculations attached to them, must be signed by all members of the commission and kept in the bookkeeping office of the MTS or sovkhoz. Copies of the documents are given to the petroleum management director, and are also sent to the oblast (kray) agricultural administration.

Normative losses, that is, losses which are admissible according to the norms, incurred when petroleum products are stored in tanks are computed by multiplying the evaporation surface, expressed in square meters for each of the tanks in which the petroleum product is being stored, by the number of months the petroleum product was kept in the corresponding tank, and then by multiplying the derived product by the value of the norm for losses, expressed in kilograms for 1 square meters of evaporation surface per month (in accordance with Table 12).

## TABLE 12

### NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS STORED IN TANKS (IN KILOGRAMS FOR 1 SQUARE METER OF EVAPORATION SURFACE PER MONTH)

| Name of petroleum product | Southern zone | | Middle zone | | Northern zone | |
|---|---|---|---|---|---|---|
| | Autumn-winter period | Spring-summer period | Autumn-winter period | Spring-summer period | Autumn-winter period | Spring-summer period |
| Automobile and aviation gasoline | 1.945 | 4.990 | 1.805 | 4.830 | 1.375 | 3.960 |
| Ligroin and tractor | 0.303 | 0.770 | 0.147 | 0.477 | 0.141 | 0.394 |
| Illuminating kerosene | 0.064 | 0.220 | 0.041 | 0.170 | 1.046 | 0.130 |
| Diesel fuel and motor oil | 0.032 | 0.110 | 0.020 | 0.083 | 0.023 | 0.065 |
| Lubricating oils and mazut | 0.080 | 0.080 | 0.080 | 0.080 | 0.080 | 0.080 |

Examples.

1. Tractor kerosene was kept in 2 vertical tanks in the southern zone during the winter. Evaporation surface of these tanks is: 10 square meters for one, and 11 square meters for the other. Kerosene was kept in the first tank for 3 months, in the second tank for 1.5 months.

It is necessary to compute the possible normative loss of kerosene while it was stored in the indicated tanks for the specified period.

In accordance with the norms listed in Table 12, the maximum loss of tractor kerosene kept in tanks in the southern zone during the autumn-winter period is 0.303 kilograms per month for each square meter of evaporation surface.

Consequently, the unknown losses are:

$X = \left[(10 \times 3)+(11 \times 1.5)\right] \times 0.303$ kilograms = 14.0895 kilograms, or, roughly, 14.1 kilograms.

2. Automobile gasoline was stored in one horizontal tank for 3 months during the winter period in the southern climatic zone. This tank has a body diameter of 2.93 meters and a length of 7.67 meters for the cylindrical part. The possible normative loss of gasoline must be computed.

In accordance with the approved norms (see Table 12), the maximum loss of automobile gasoline kept in tanks in the southern zone during the autumn-winter period is 4.99 kilograms per month for 1 square meter of evaporation face.

In accordance with the formula given above, the area of the evaporation face is:

$$F = 0.865 \times 2.93 \times 7.67 = 19.4 \text{ square meters.}$$

**Thus, the unknown normative loss of gasoline in the given tank will be:**

$$X = 19.4 \times 3 \times 4.99 = 290.5 \text{ kilograms.}$$

## NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS STORED IN BARRELS

For storing petroleum products in barrels, norms of maximum losses have been approved in percentages of weight per month of the quantity of petroleum products to be stored (Table 13).

Consequently, normative losses of petroleum products stored in barrels is computed by finding the percentage of quantity of petroleum product being stored and multiplying the derived result by the number of months of storage.

[Table 13 on following page]

## NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS WHEN THEY ARE ACCEPTED AND RELEASED

When petroleum products are accepted and released, their possible losses must always be correctly related to the place where these losses can actually occur and where they must be allowed for.

Suppose, for example, that an MTS petroleum base has released fuel by unloading it from its tank into a service cart to be sent to a tractor brigade.

If spills and leakages do not occur, fuel losses here must have taken place basically as the result of evaporation in the capacity of the service cart and only indirectly have an effect upon

TABLE 13

NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS STORED IN BARRELS

(IN PERCENTAGES OF WEIGHT PER MONTH)

| Name of petroleum product | Southern zone | | Middle zone | | Northern zone | |
|---|---|---|---|---|---|---|
| | Autumn-winter period | Spring-summer period | Autumn-winter period | Spring-summer period | Autumn-winter period | Spring-summer period |
| Automobile and aviation gasoline | 0.058 | 0.116 | 0.050 | 0.104 | 0.042 | 0.092 |
| Ligroin, tractor and illuminating kerosene, diesel fuel | 0.050 | 0.100 | 0.042 | 0.084 | 0.033 | 0.066 |
| Lubricating oils | 0.028 | 0.042 | 0.028 | 0.042 | 0.028 | 0.042 |
| Solidol and axle grease | 0.035 | 0.080 | 0.035 | 0.080 | 0.035 | 0.080 |
| Lubricating and furnace mazuts, petroleum asphalts, motor oil | 0.035 | 0.050 | 0.035 | 0.050 | 0.035 | 0.050 |

increasing evaporation in the depot tank (as a result of the increase in volume of gas space).

The petroleum base must accept the indicated losses on its own account only if the released fuel is quantitatively measured and allowed for after the losses actually incurred in this process are deducted. This can occur if the quantity of fuel released is allowed for by measuring it in the capacity of the service cart. On the other hand, if the determination of the quantity of released fuel is conducted by a device that measures it in the petroleum base's own tank (due to variations of level of the liquid in the container before and after its release), the loss incurred in this process will not have any direct influence whatsoever upon the petroleum base's supply of fuel. Thus, in the latter instance the petroleum base does not have the right to apply the norm for diminution of fuel when it is released, since it did not have the corresponding loss (the actual loss had an effect only upon the quantity of fuel received by its acceptor).

From what has been said it is clear that norms for maximum losses of petroleum products when they are accepted or released can be applied only once for each operation. Appropriate instructions for applying norms for maximum losses of petroleum products in MTS and sovkhoz petroleum managements are given below in this same paragraph.

Norms for maximum losses when accepting and releasing petroleum products have been approved in percentages to the amount accepted or released (Tables 14 and 15).

## TABLE 14

### NORMS FOR MAXIMUM LOSSES WHEN ACCEPTING PETROLEUM PRODUCTS (IN PERCENTAGES TO THE AMOUNT ACCEPTED)

| Name of petroleum product | Southern zone: Autumn-winter period | Southern zone: Spring-summer period | Middle zone: Autumn-winter period | Middle zone: Spring-summer period | Northern zone: Autumn-winter period | Northern zone: Spring summer period |
|---|---|---|---|---|---|---|
| Automobile and aviation gasoline | 0.164 | 0.233 | 0.136 | 0.214 | 0.122 | 0.199 |
| Ligroin and tractor kerosene | 0.043 | 0.068 | 0.035 | 0.060 | 0.030 | 0.053 |
| Illuminating kerosene | 0.025 | 0.033 | 0.024 | 0.030 | 0.023 | 0.028 |
| Diesel fuel | 0.012 | 0.016 | 0.012 | 0.015 | 0.012 | 0.014 |
| Straight-run distillation mazut and motor oil | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Solidol and axle grease | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Spindle and transformer oil, avtol 6 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Machine, motor, diesel oil cylinder oil 2 avtol 10 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Cylinder oil 6, avtol 18 nigrol, petroleum asphalts, cracked mazut | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |

Note: If the petroleum product is accepted by the measurement of the recipient's tank, losses in acceptance are not computed.

TABLE 15

NORMS FOR LIMITING LOSSES WHEN RELEASING PETROLEUM PRODUCTS

(IN PERCENTAGES TO THE AMOUNT RELEASED)

| Name of petroleum product | Southern zone | | Middle zone | | Northern zone | |
|---|---|---|---|---|---|---|
| | Autumn-winter period | Spring-summer period | Autumn-winter period | Spring-summer period | Autumn-winter period | Spring-summer period |
| Automobile and aviation gasoline | 0.224 | 0.293 | 0.19[illegible] | 0.274 | 0.182 | 0.259 |
| Ligroin and tractor kerosene | 0.123 | 0.148 | 0.115 | 0.140 | 0.110 | 0.133 |
| Illuminating kerosene | 0.105 | 0.133 | 0.104 | 0.111 | 0.103 | 0.105 |
| Diesel fuel | 0.050 | 0.057 | 0.050 | 0.055 | 0.050 | 0.053 |
| Oils, mazut, motor oil | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

Normative losses of petroleum products when they are accepted or released in one operation are determined by deducting the percentage of maximum losses from the amount of petroleum products accepted or released.





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## NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS DURING MOTOR HAULAGES

Norms for maximum losses of petroleum products during motor haulages have been approved in percentages to the quantities being hauled. These norms are shown in Table 16.

## APPLICATION OF NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS DURING [illegible] OPERATIONS

Norms for maximum losses are applied in MTS and sovkhoses, as has been shown above, only in the event that an actual shortage of petroleum products has been established. However, in no event must these norms be applied to the total of all operations or to the total of all amounts of petroleum products received or expended. For example, norms for fuel losses during haulage can be applied only when a shortage has actually occurred as a result of haulage, or when the hauled amounts, because they were sealed or because of other similar reasons, were accepted at the MTS petroleum base or at the tractor brigade without being weighed a second time or without any other quantitative measurement.

The application of individual norms must correspond to the character of the operations, and also to the place of execution. For example, if the MTS petroleum base has received, stored, and released to the tractor brigade avtol which was stored in barrels, norms for avtol losses during release cannot be applied for the petroleum base, unless at the end of the year it has a shortage of avtol which exceeds the norm for loss of this oil during storage, etc.



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## TABLE 16

### NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS DURING MOTOR HAULAGES (IN PERCENTAGES TO THE AMOUNT BEING HAULED)

| Name of the petroleum product | Types of containers | Norm of maximum losses |
|---|---|---|
| Gasoline | Barrels | 0.15 |
| | Truck tanks | 0.10 |
| Ligroin, kerosene, diesel fuel | Barrels | 0.10 |
| | Truck tanks | 0.05 |
| Truck and tractor oils (avtols, diesel oil, nigrol) | Barrels | .05 |
| General industrial and special oils | Barrels | 0.10 |
| | Truck tanks | 0.05 |

Notes:

1. Norms for maximum losses during haulages have not been established for other petroleum products.

2. In each individual instance of applying the norms indicating the causes of losses.

Table 17 shows what norms for maximum losses of petroleum products can be applied in the various links of MTS and sovkhoz petroleum managements (petroleum bases, filling stations), depending upon the character of operations with the petroleum products.

TABLE 17

APPLICATION OF NORMS FOR MAXIMUM LOSSES OF PETROLEUM PRODUCTS DURING DIFFERENT OPERATIONS IN DIFFERENT LINKS OF PETROLEUM MANAGEMENT

| Name of the operation | What norms for losses of petroleum products are applied | Conditions for applying the norms |
|---|---|---|
| [1] | [2] | [3] |
| | A. MTS and sovkhoz petroleum bases | |
| 1. Accepting petroleum product delivered by motor transport | Norms for losses during haulage (Table 16) | If a shortage turns up as the result of the quantitative acceptance of the petroleum products from the haulers, or when the petroleum products are accepted by the petroleum base without checking their weight. In the latter instance, the norm for diminution in haulage can be accounted for when removing the physical balances of petroleum products at the petroleum base. |
| 2. Pumping petroleum products delivered to the petroleum base into tanks | Norms for losses during acceptance (Table 14) | If the quantitative acceptance was carried out prior to loading the petroleum products into the tanks of the petroleum base, and also if the petroleum products were accepted from own transportation |

| [1] | [2] | [3] |
|---|---|---|
| | | without quantitative measurements. Norms for losses are accounted for when inventorying the balances. |
| 3. Storing petroleum products in tanks or wheeled tanks (various tow tanks) | Norms for losses during storage (Table 12) | Norms are accounted for when inventorying the balances. |
| 4. Storing petroleum in barrels and other small containers | Norms for losses during storage (Table 13) | Norms are accounted for when inventorying the balances. |
| 5. Releasing petroleum products to tractor brigades and to other consumers (repair shop, etc) | Norms for losses during release (Table 15) | If the petroleum products are released by unloading from a tank or by pouring from barrels or other containers. However, the condition must be observed that quantitative measurements of petroleum products released are not carried out by determining the difference in the amount on hand in the petroleum base capacity before release and after release. |

| [1] | [2] | [3] |
| --- | --- | --- |
| 6. Servicing trucks in farmsteads of the management from a filling station, when the man servicing the trucks is not a warehouseman of the petroleum base and receives petroleum products for servicing trucks to be accounted for on an individual material account. | | Norms for losses are applied for this link of petroleum management independently, depending on the character of operations (see paragraphs 2-5 of this table). |

B. Tractor brigades

| [1] | [2] | [3] |
| --- | --- | --- |
| 7. Accepting petroleum products delivered by motor transport | Norms for losses during haulage (Table 16) | In accordance with the instructions given above, in paragraph 1 of this table. |

| [1] | [2] | [3] |
|---|---|---|
| 8. Pumping petroleum products delivered to the tractor brigade from the transportation capacity into petroleum containers belonging to the brigade | Norms for losses during acceptance (Table 14) | These norms are applied only in the following instances: (a) when unloading fuel delivered in truck tanks into any petroleum containers belonging to the brigade; (b) when unloading fuel delivered in barrels into stationary tanks or wheeled tanks; (c) when unloading petroleum products delivered in barrels into the capacities of service carts. Norms for losses during acceptance are accounted for when inventorying balances of petroleum products in tractor brigades. |
| 9. Storing petroleum products in brigade petroleum containers | Depending upon the type of petroleum container in which petroleum products will be stored, anticipated in Table 12 and 13, are used. | Norms are accounted for when inventorying balances. |

| [1] | [2] | [3] |
|---|---|---|
| 10. Releasing petroleum products from brigade petroleum containers into service carts | Norms for losses during release (Table 15) | Norms are applied only when loading fuel from tanks or wheel tanks into service cart capacities. However losses in accordance with the norms can be accounted for only when inventorying balances of petroleum products in the tractor brigade. |
| 11. Servicing tractors and combines | Norms for losses during release (Table 15) | Norms are applied for all quantities of petroleum products that tractors and combines are serviced with. Norms are accounted for when inventorying the balances. |